



2016 NIAC Symposium



Raleigh, NC – August 23-25, 2016

Tuesday, August 23

- 8:30 **Welcome & Overview** *Jason Derleth, NIAC Program Executive*
- 8:50 **Flight Opportunities** *Robert Yang, Program Executive, NASA Flight Opportunities*
- 9:00 **Keynote Address** *Rick Loverd, Program Director, National Academy of Sciences
The Science & Entertainment Exchange
Joe Robert Cole, Screenwriter, Producer, Director*
- 10:00 **AIAA Welcoming Remarks** *Tobey Jackson, AIAA*
- 10:05 Break**
- 10:20 *Michael VanWoerkom, Exoterra Resource, LLC , NIMPH: Nano Icy Moons Propellant Harvester*
- 10:45 *Stephanie Thomas, Princeton Satellite Systems, Inc., Fusion-Enabled Pluto Orbiter and Lander*
- 11:10 *Jonathan Sauder, NASA Jet Propulsion Laboratory, Automaton Rover for Extreme Environments (AREE)*
- 11:35 *Lynn Rothschild, NASA Ames Research Center, Urban biomining meets printable electronics: end-to-end destination biological recycling and reprinting*
- 12:00 Lunch**
- 1:30 **POSTER SESSION**
- 2:30 *Robert Youngquist, NASA Kennedy Space Center, Cryogenic Selective Surfaces*
- 2:55 *Melville Ulmer, Northwestern University, Further Development of Aperture: A Precise Extremely Large Reflective Telescope Using Re-configurable Elements*
- 3:20 *Robert Skelton, Texas A&M University, Tensegrity Approaches to In-Space Construction of a 1g Growable Habitat*
- 3:45 Break**
- 4:05 *Bruce Wiegmann, NASA Marshall Space Flight Center, Heliopause Electrostatic Rapid Transit System (HERTS)*
- 4:30 *Adrian Stoica, NASA Jet Propulsion Laboratory, Trans-Formers for Lunar Extreme Environments: Ensuring Long-Term Operations in Regions of Darkness and Low Temperatures*
- 4:55 *Michael Paul, Pennsylvania State University, SCEPS in Space - Non-Radioisotope Power Systems for Sunless Solar System Exploration Missions*
- 5:20 **Adjourn**
- 7:00 **Revolutionary Grand Challenges Session with Robert Cassanova and Frank Martin**



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Wednesday, August 24

- 8:30 **NIAC Plans and Announcements** *Jason Derleth, NIAC Program Executive*
- 9:00 **Keynote Address** *Dr. Roger Launius, Associate Director for Collections & Curatorial Affairs, National Air & Space Museum*
- 10:00 Break**
- 10:20 *Marco Quadrelli, NASA Jet Propulsion Laboratory, E-Glider: Active Electrostatic Flight for Airless Body Exploration*
- 10:45 *Masahiro Ono, NASA Jet Propulsion Laboratory, Journey to the Center of Icy Moons*
- 11:10 *Robert Mueller, NASA Kennedy Space Center, Mars Molniya Orbit Atmospheric Resource Mining*
- 11:35 *Chris Mann, Nanohmics, Inc., Stellar Echo Imaging of Exoplanets*
- 12:00 Lunch**
- 1:30 *POSTER SESSION*
- 2:30 *Joshua Rovey, University of Missouri, Rolla, Experimental Demonstration and System Analysis for Plasmonic Force Propulsion*
- 2:55 *Philip Lubin, University of California, Santa Barbara, Directed Energy for Interstellar Study*
- 3:20 *David Kirtley, MSNW, LLC Magnetoshell Aerocapture for Manned Missions and Planetary Deep Space Orbiters*
- 3:45 Break**
- 4:05 *Steven Oleson, NASA Glenn Research Center Titan Submarine: Exploring the Depths of Kraken Mare*
- 4:30 *Jeffrey Nosanov, Nosanov Consulting, LLC PERISCOPE: PERIapsis Subsurface Cave Optical Explorer*
- 4:55 Adjourn**



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Thursday, August 25

- 8:30 **Other Topics** *Final Remarks, Jason Derleth*
- 9:00 **Keynote Address** *Dr. Penelope Boston, Director, NASA Astrobiology Institute
NIAC Fellow, NIAC External Council Member
“Gadgets, Widgets, and Contraptions: Technology Needs for Astrobiology”*
- 10:00 Break**
- 10:20 *Siegfried Janson, The Aerospace Corporation, Brane Craft*
- 10:45 *Gary Hughes, California Polytechnic State University, Molecular Composition Analysis of Distant Targets*
- 11:10 *Jason Dunn, Made In Space, Inc., Reconstituting Asteroids into Mechanical Automata*
- 11:35 *Ratnakumar Bugga, NASA Jet Propulsion Laboratory Venus Interior Probe Using In-situ Power and Propulsion (VIP-INSPIRE)*
- 12:00 Lunch**
- 1:30 *POSTER SESSION*
- 2:30 *Javid Bayandor, Virginia Polytechnic Institute and State University, Light Weight Multifunctional Planetary Probe for Extreme Environment Exploration and Locomotion*
- 2:55 *Bin Chen, University of California, Santa Cruz, 3D Photocatalytic Air Processor for Dramatic Reduction of Life Support Mass and Complexity*
- 3:20 *Justin Atchison, Johns Hopkins University, Swarm Flyby Gravimetry*
- 3:45 Break**
- 4:05 *William Engblom, Embry-Riddle Aeronautical University, Flight Demonstration of Novel Atmospheric Satellite Concept*
- 4:30 *John Bradford, Spaceworks Engineering, Inc., Advancing Torpor Inducing Transfer Habitats for Human Stasis to Mars*
- 4:55 **NIAC Q&A** *NIAC Staff*
- 5:20 Adjourn**



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ABOUT NIAC:

The NASA Innovative Advanced Concepts (NIAC) Program supports early studies of visionary concepts that could one day “change the possible” in space and aeronautics. NIAC studies develop and assess revolutionary, yet credible, aerospace architecture, mission, and system concepts. They aim to enable far-term capabilities, and spawn exciting innovations to radically improve aerospace exploration, science, and operations.

NIAC also contributes to the Nation's leadership in key research and technology areas, and fosters outreach, education, and economic benefits. Part of the Space Technology Mission Directorate, NIAC is the most open-ended and far-reaching program in NASA.

2016 NIAC SYMPOSIUM SPEAKERS:



Keynote Address

Rick Loverd, Program Director

National Academy of Sciences

The Science & Entertainment Exchange

Rick Loverd directs a program of the National Academy of Sciences called The Science & Entertainment Exchange. Its mission is to inspire better science in Hollywood by introducing entertainment professionals to great science communicators. Since its launch in 2008, The Exchange has completed more than 1,500 consults including IRON MAN 2, THOR, TRON: LEGACY, AVENGERS: AGE OF ULTRON, STAR TREK: INTO THE DARKNESS, MAN OF STEEL, Fringe, CASTLE, BOURNE: LEGACY, The Good Wife, CAPTAIN AMERICA: THE WINTER SOLDIER, BIG HERO 6, and 10 CLOVERFIELD LANE. During his time at The Exchange, the program has produced more than 250 events in Los Angeles, New York, Scottsdale, and Napa Valley targeted at the Hollywood community.



Keynote Address

Joe Robert Cole

Screenwriter, Producer, Director

Joe Robert Cole is a writer/producer/director who enjoys crafting smart, rich character journeys as well as creating tentpole, world-building projects. Currently writing Marvel's “Black Panther,” Joe spent last year as a Producer/Writer on the Emmy nominated “American Crime Story: The People Vs. OJ” for FX. For Lionsgate he wrote “Revoc” a grounded sci-fi action thriller with Mandeville Films producing and is adapting the James Rollins Sigma Force novel series into a feature franchise. Joe recently was part of a Hasbro think tank to create a cohesive cinematic universe for the toy brands: GI JOE, ROM, M.A.S.K. and Visionaries.



Keynote Address

Dr. Roger Launius

**Associate Director for Collections & Curatorial Affairs
National Air & Space Museum**

Roger D. Launius is Associate Director of Collections and Curatorial Affairs at the Smithsonian Institution's National Air and Space Museum in Washington, D.C. Between 1990 and 2002 he served as chief historian of the National Aeronautics and Space Administration. A graduate of Graceland College in Lamoni, Iowa, he received his Ph.D. from Louisiana State University, Baton Rouge, in 1982 and worked as a civilian historian with the United States Air Force until 1990. He has written or edited more than twenty books on aerospace history, including *Exploring the Solar System: The History and Science of Planetary Probes* (Palgrave Macmillan, 2012); *Coming Home: Reentry and Recovery from Space* (NASA SP-2011-593, 2012), which received the AIAA's history manuscript prize; *Globalizing Polar Science: Reconsidering the International Polar and Geophysical Years* (Palgrave Macmillan, 2010); *Smithsonian Atlas of Space Exploration* (HarperCollins, 2009); *Robots in Space: Technology, Evolution, and Interplanetary Travel* (Johns Hopkins University Press, 2008); *Societal Impact of Spaceflight* (NASA SP-2007-4801, 2007); *Critical Issues in the History of Spaceflight* (NASA SP-2006-4702, 2006); *Space: A Journey to Our Future* (Tehabi Books, 2004); *Space Stations: Base Camps to the Stars* (Smithsonian Books, 2003; 2nd ed. 2009), which received the AIAA's history manuscript prize; *Flight: A Celebration of 100 Years in Art and Literature* (Welcome Books, 2003); *Taking Off: A Century of Manned Flight* (American Institute for Aeronautics and Astronautics, 2003); *Reconsidering a Century of Flight* (University of North Carolina Press, 2003); *To Reach the High Frontier: A History of U.S. Launch Vehicles* (University Press of Kentucky, 2002); *Imagining Space: Achievements, Possibilities, Projections, 1950-2050* (Chronicle Books, 2001); *Reconsidering Sputnik: Forty Years Since the Soviet Satellite* (Harwood Academic, 2000); *Innovation and the Development of Flight* (Texas A&M University Press, 1999); *NASA & the Exploration of Space* (Stewart, Tabori, & Chang, 1998); *Frontiers of Space Exploration* (Greenwood Press, 1998, rev. ed. 2004); *Spaceflight and the Myth of Presidential Leadership* (University of Illinois Press, 1997); *NASA: A History of the U.S. Civil Space Program* (Krieger Publishing Co., 1994, rev. ed. 2001); and others.

He is a recipient of the Exceptional Service Medal and the Exceptional Achievement Medal from NASA. In 2009 he received the John F. Kennedy Astronautics Award from the American Astronautical Society, the Secretary's Research Prize from the Smithsonian Institution, and the Roger R. Trask Award from the Society for History in the Federal Government, 2009. In addition, he is a Fellow of the American Association for the Advancement of Science, the International Academy of Astronautics, and the American Astronautical Society; and Associate Fellow of the American Institute for Aeronautics and Astronautics. He is frequently consulted by the electronic and print media for his views on space issues, and has been a guest commentator on National Public Radio and all the major television networks.



Keynote Address

Dr. Penelope Boston

Director, NASA Astrobiology Institute

Past NIAC Fellow and NIAC External Council Member

Dr. Penelope Boston is Director of the NASA Astrobiology Institute at NASA Ames Research Center in California. Personal research areas include geomicrobiology and astrobiology in extreme environments (especially caves and mines, hot and cold deserts, high latitudes and altitudes); geological processes creating caves on other planets and moons; human life support issues in space and planetary environments; and use of robotics and other technologies to assist exploration and science in extreme Earth and extraterrestrial environments.

Boston is author of over 160 technical and popular publications and editor of 4 volumes. Her work has been featured in ~200 print and broadcast media outlets, as a child of a theatrical family, she first went on the stage at the age of 3 and apparently hasn't come off since.... She has served on the NRC Space Studies Board, the NASA Advisory Council Planetary Protection Subcommittee, and the External Council of the NASA Innovative Advanced Concepts. Boston is recipient of the 2010 Lifetime Achievement in Science Award from the National Speleological Society, a Fellow of the NASA Institute for Advanced Concepts (since 2000), and a recent Distinguished Visiting Lecturer for Phi Beta Kappa (2013-2014). As a graduate student in the 1980's, she co-founded the Case for Mars series of conferences and activities devoted to the human exploration of Mars.

Dr. Boston holds a PhD from the University of Colorado, Boulder in Microbiology and Atmospheric Chemistry, earned on an Advanced Studies Program Fellowship at the National Center for Atmospheric Research. She was a National Research Council Post-doctoral Fellow at NASA Langley Research Center in Virginia. From 2002-2016, she was Director of the Cave & Karst Studies Program and Chair of the Earth & Environmental Sciences Dept. at New Mexico Institute of Mining & Technology, in Socorro, New Mexico and the Associate Director of the National Cave and Karst Research Institute in Carlsbad, New Mexico.